



U.S. Department  
of Transportation  
**Federal Highway  
Administration**

400 Seventh St., S.W.  
Washington, D.C. 20590

Refer to: HSA-1\WZ-61

Mr. Chuck Bailey  
Plastic Safety Systems, Inc.  
P.O. Box 20140  
Cleveland, OH 44120

Dear Mr. Bailey:

Thank you for your letter of November 17 to Mr. Nicholas Artimovich of my office requesting Federal Highway Administration (FHWA) acceptance of your company's Type III plastic barricade as a crashworthy traffic control device for use in work zones on the National Highway System (NHS). Accompanying your letter was a report from the Midwest Roadside Safety Facility and videos of the crash tests. You requested that we find your company's Type III barricades acceptable for use on the NHS under the provisions of National Cooperative Highway Research Program (NCHRP) Report 350 "Recommended Procedures for the Safety Performance Evaluation of Highway Features."

### **Introduction**

The FHWA guidance on crash testing of work zone traffic control devices is contained in two memoranda. The first, dated July 25, 1997, titled "Information: Identifying Acceptable Highway Safety Features," established four categories of work zone devices: Category I devices were those lightweight devices which could be self-certified by the vendor, Category II devices were other lightweight devices which needed individual crash testing, Category III devices were barriers and other fixed or massive devices also needing crash testing, and Category IV devices were trailer mounted lighted signs, arrow panels, etc. The second guidance memorandum was issued on August 28, 1998, and is titled "INFORMATION: Crash Tested Work Zone Traffic Control Devices." This later memorandum lists devices that are acceptable under Categories I, II, and III.

A brief description of the devices for which you are requesting acceptance follows:

The horizontal rails, or "legs," are 1217 mm long and are placed 1225 mm apart. Underneath each end of the legs rubber pads are attached to increase friction with the pavement. On the top center of each leg is bolted a 127 mm x 76 mm steel plate, to which is welded a 72 mm diameter x 3.06 mm wall x 200-mm long steel tube. These steel tubes support the vertical upright masts which are 88 mm square x 5.08 mm wall x 1521 mm long High Density Polyethylene (HDPE) plastic. To these vertical masts are bolted (with 1/4 - 20 bolts and nuts with washers) three 205 mm wide x 22.75 mm thick x 2435 mm long HDPE honeycomb extrusions. A "ballast board" was also used to connect the legs. This 130 mm wide x 29.83 mm thick x 1225 mm long HDPE extrusion with a wall thickness of 6.1 mm was installed as a safer location to place sandbags.

The Plastic Safety Systems Type III (PSS Type III) Plastic Barricade is shown in the enclosed drawing. Although the two tested barricades were constructed of similar components and are nominally identical, there were minor differences in the lengths of some components. These differences were well within normal construction tolerances and are considered insignificant with respect to crashworthiness.

### Testing

Full-scale automobile testing was conducted on your company's devices. Two stand-alone examples of each device were tested in tandem, one head-on and the next placed six meters downstream turned at 90 degrees, as called for in our guidance memoranda.

The crash test is summarized in the table below:

Test Number	PSS - 1	
Test Article - PSS Type III	Head On	90 Degrees
Height to Top Rail	1521 mm	1523 mm
Flags or lights	None	
Test Article Mass (each)	21.3 kg	21.3 kg
Vehicle Inertial Mass	811 kg	
Impact Speed	101.4 km/h	97.4 km/h
Velocity Change*	1.11 m/s	n/a
Vehicle crush	None	None
Occupant Compart. Intrusion	None	None
Windshield Damage	Minor cracking	Minor cracking

\* The velocity change recorded for the head-on hit is the difference between the impact speed of the vehicle into the first stand and then into the second. The velocity change for the 90 degree hit was not recorded.

### Findings

Damage was limited to slight to moderate cracking of the windshield and superficial damage (scrapes) to the bumper, hood, quarterpanel, and doors. In the head-on test the center line of the car was aligned with one of the vertical upright posts of the barricade. During the impact the top of the post struck the windshield and caused some cracking in both layers of glass though there did not appear to be any potential for penetration. The results of the test met the FHWA requirements and, therefore, the PSS Type III Barricade described above and shown in the enclosed drawings for reference are acceptable for use as Test Level 3 devices on the NHS under the range of conditions tested, when proposed by a State.

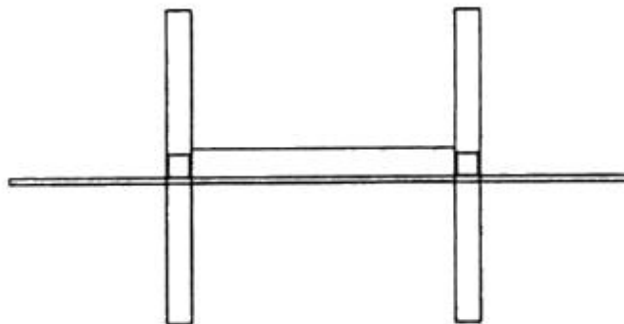
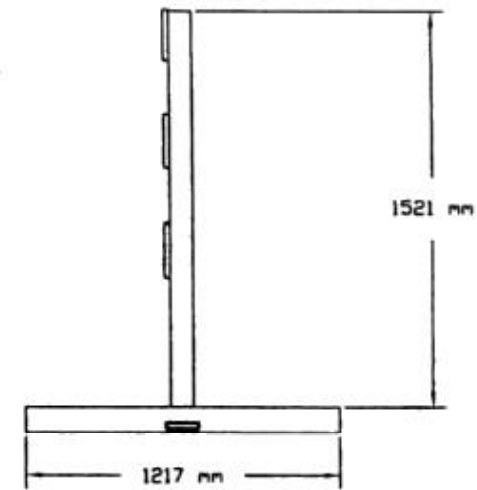
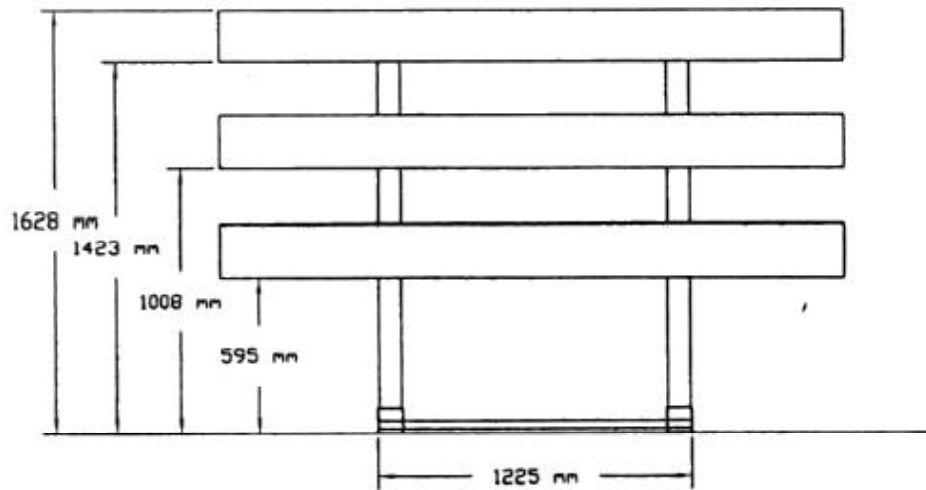
Please note the following standard provisions which apply to FHWA letters of acceptance:

- ! Our acceptance is limited to the crashworthiness characteristics of the devices and does not cover their structural features, nor conformity with the Manual on Uniform Traffic Control Devices.
- ! Any changes that may adversely influence the crashworthiness of the device will require a new acceptance letter.
- ! Should the FHWA discover that the qualification testing was flawed, that in-service performance reveals unacceptable safety problems, or that the device being marketed is significantly different from the version that was crash tested, it reserves the right to modify or revoke its acceptance.
- ! You will be expected to supply potential users with sufficient information on design and installation requirements to ensure proper performance.
- ! You will be expected to certify to potential users that the hardware furnished has essentially the same chemistry, mechanical properties, and geometry as that submitted for acceptance, and that they will meet the crashworthiness requirements of FHWA and NCHRP Report 350.
- ! To prevent misunderstanding by others, this letter of acceptance, designated as number WZ-61 shall not be reproduced except in full. This letter, and the test documentation upon which this letter is based, is public information. All such letters and documentation may be reviewed at our office upon request.
- ! Plastic Safety Systems Barricades may include patented components and if so are considered "proprietary." The use of proprietary work zone traffic control devices in Federal-aid projects is generally of a temporary nature. They are selected by the contractor for use as needed and removed upon completion of the project. Under such conditions they can be presumed to meet requirement "a" given below for the use of proprietary products on Federal-aid projects. On the other hand, if proprietary devices are specified for use on Federal-aid projects, except exempt, non-NHS projects, they: (a) must be supplied through competitive bidding with equally suitable unpatented items; (b) the highway agency must certify that they are essential for synchronization with existing highway facilities or that no equally suitable alternative exists or; (c) they must be used for research or for a distinctive type of construction on relatively short sections of road for experimental purposes. Our regulations concerning proprietary products are contained in Title 23, Code of Federal Regulations, Section 635.411, a copy of which is enclosed.

Sincerely yours,

Frederick G. Wright, Jr.  
Program Manager, Safety

Enclosure



#### PLASTIC TYPE III BARRICADE

- Vertical Upright Masts – 88 mm x 88 mm x 5.08 mm wall x 1521 mm long HDPE
- Legs, Horizontal Portion – 98 mm x 98 mm x 4.44 mm wall x 1217 mm long HDPE
- Legs, Vertical Portion – 72.00 mm diameter x 3.06 mm wall x 200 mm long steel
- Ballast Board – 130 mm wide x 29.83 mm thick x 1225 mm long HDPE with a wall thickness of 6.10 mm
- Small Panels – HDPE honeycomb extrusions
  - Top Panel – 205 mm wide x 22.64 mm thick x 2435 mm long
  - Middle Panel – 205 mm wide x 22.91 mm thick x 2430 mm long
  - Bottom Panel – 205 mm wide x 22.68 mm thick x 2434 mm long

Figure 1. System No. 1 Barricade Details, Test PSS-1